CAPLESS FLUID RESERVOIR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

[0002] Not applicable.

BACKGROUND OF THE INVENTION

Field of the Invention

[0003] The invention relates to a seal for a fluid reservoir. In one of its aspects, the invention relates to a fluid reservoir within a larger receptacle, the seal operable with a cover of the larger receptacle.

Description of Related Art

[0004] In automobiles, particularly automobile engine compartments, certain fluid reservoirs are found. These can include a windshield washer fluid reservoir and a coolant overflow/reservoir. These fluid reservoirs are unpressurized and are generally formed of a blow-molded plastic material, including a short filler neck covered by a friction- or snap-fit cap. The cap prevents debris from entering the reservoir, and is removable for a vehicle operator to add fluid to the reservoir as needed. The cap is often tethered to the reservoir, but the tether can break, or can bias the cap over the fill opening while the user is attempting to replenish the fluid.

[0005] It would be advantageous to provide a fill opening of a fluid reservoir capable of preventing unwanted debris from entering the reservoir while in use, but readily accessible to a user when adding the desired fluid to the reservoir.

BRIEF SUMMARY OF THE INVENTION

[0006] A seal within the filler neck of a fluid reservoir is configured to provide fluid channels into the reservoir while in the at-rest position, but seals the filler neck when deformed by an externally directed insert in the filler neck.

[0007] In one embodiment, the seal is a hollow bulb with a frusto-conical surface spaced from a parallel frusto-conical surface of the filler neck by a plurality of ribs therebetween. The gap between the ribs, and between the surfaces of the seal and the filler neck, form fluid channels for replenishing the reservoir. A plunger inserted into the filler neck deflects the seal outwardly into

contact with the filler neck, closing the fluid channels and preventing matter from entering the fluid reservoir.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0008] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0009] Figure 1 is a cross-sectional view of a filler neck for a fluid reservoir according to the invention, in an unsealed condition.

[0010] Figure 2 is a cross-sectional view taken through line 2-2 of Figure 1.

[0011] Figure 3 is a cross-sectional view taken through line 3-3 of Figure 1.

[0012] Figure 4 is a cross-sectional view of the filler neck of Figure 1, in a sealed condition.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Referring to Figure 1, a filler neck assembly 10 includes a tubular section 22 fluidly connected to a fluid reservoir (not shown), and to a filler neck opening in the form of an open cylindrical receptacle 20. The open cylindrical receptacle 20 is connected to the tubular section 22 by an inwardly tapering frusto-conical section 24. Proximate the junction of the receptacle 20 and the tubular section 22, a wheel spoke frame 26 is fixedly mounted across the opening of the tubular section 22.

[0014] With reference to Figures 2-3, the frame 26 is formed of a center hub 30, a perimeter rim 27, and radially extending spokes 29 suspending the hub 28 substantially centered within the tubular section 22. Gaps formed between the spokes fluidly connect the receptacle 20 with the tubular section 22. An upwardly/outwardly projecting stud 30 projects from the hub 28 into the center of the receptacle 20. The frame 26 supports a mesh screen 32 substantially covering the whole of the opening of the tubular section 22.

[0015] Referring again to Figure 1, stud 30 extends upwardly from the hub 28 of the wheel spoke frame 26 and is serrated. The stud 30 projects into the cylindrical receptacle 20 and is adapted to mount a resilient seal 50 in the frusto-conical section 24 between the cylindrical receptacle 20 and the tubular section 22.

[0016] The resilient seal 50 comprises a substantially frusto-conical main section 52, a spherical upper face 56, and a number of radial ribs 54 projecting from the face of the frusto-conical section 52. The outer face of the frusto-conical main section 52 is formed having a similar profile to the frusto-conical section 24 so that with the seal 50 mounted on the stud 30, the face

of the seal frusto-conical main section 52 and the wall of the frusto-conical section 24 of the receptacle 20 are substantially parallel. The radial ribs 54 projecting from the face of the seal 50 contact the wall of the frusto-conical section 24 to center the seal therein and maintain a uniform gap and form fluid passages 58 (see Figure 3) between the seal 50 and the frusto-conical section 24, and between neighboring radial ribs 54. The ribs 54 are further arcuate in cross-section, as shown in Figure 1, and taper into a continuous curve with the spherical portion 56 of the seal 50. It is further anticipated that the ribs 54 can be, in the alternative, molded into the frusto-conical section 24 to center the seal 50.

[0017] Referring now to Figure 4, the seal 50 is adaptable to deform and seal the tubular section 22 from the cylindrical section 20. To accomplish this, a substantially cylindrical plunger 70 is inserted centrally into the cylindrical receptacle 20. The face 72 of the plunger 70 contacts the spherical face 56 of the resilient seal 50 and displaces it towards the frusto-conical section 24.

[0018] As the spherical face 56 is flattened and displaced by the plunger 70, the periphery 60 of the seal 50 is displaced outwardly. The ribs 54 taper in towards the periphery 60 of the spherical face 56 until, at the periphery 60, the seal 50 forms a uniform circular section. As the seal 50 is displaced outwardly, this circular periphery 60 of the seal 50 contacts and conforms to the wall of the frusto-conical section 24 and/or the cylindrical receptacle 20, forming a fluid-tight seal. In a configuration wherein the ribs are formed on the frusto-conical section 24, the periphery 60 would form a seal with the wall of the frusto-conical section 24 above the ribs.

[0019] When the plunger 70 is removed, the resilient seal 50 rebounds to its original shape, with fluid channels 58 again formed between the seal 50 and the wall of the frusto-conical section 24, and between the periphery 60 and the cylindrical section 20. In one exemplary embodiment of the invention, the plunger 70 is affixed to an underside of the vehicle hood 74, so that when the hood is opened, the fluid filler assembly 10 is readily accessible with no further action on the part of the user. The cylindrical section 20 is further amenable to receive the neck of an inverted fluid container, for unattended replenishment of the fluid reservoir.

[0020] While the invention has been described in the specification and illustrated in the drawings with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention as defined in the claims. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the

invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment illustrated by the drawings and described in the specification as the best mode presently contemplated for carrying out this invention, but that the invention will include any embodiments falling within the scope of the appended claims.